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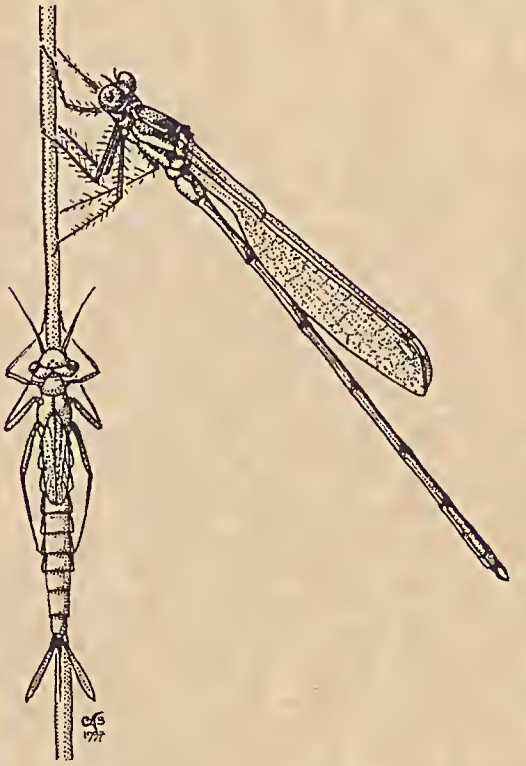

News Bulletin of The Entomological Society of Victoria Inc.

THE ENTOMOLOGICAL SOCIETY OF VICTORIA (Inc)

MEMBERSHIP

Any person with an interest in entomology shall be eligible for Ordinary membership. Members of the Society include professional, amateur and student entomologists, all of whom receive the Society's News Bulletin, the Victorian Entomologist.

OBJECTIVES

The aims of the Society are:

(a) to stimulate the scientific study and discussion of all aspects of entomology,
(b) to gather, disseminate and record knowledge of all identifiable Australian insect species,
(c) to compile a comprehensive list of all Victorian insect species,
(d) to bring together in a congenial but scientific atmosphere all persons interested in entomology.

MEETINGS

The Society's meetings are held at room AG17, La Trobe University Carlton Campus, 625 Swanston Street, Carlton, Melway reference Map 2B E10 at 8 p.m. on the third Friday of even months, with the possible exception of the December meeting which may be held earlier. Lectures by guest speakers or members are a feature of many meetings at which there is ample opportunity for informal discussion between members with similar interests. Forums are also conducted by members on their own particular interest so that others may participate in discussions.

SUBSCRIPTIONS

Ordinary Member	$20.00
Country Member	$16.00 (Over 100 km from GPO Melbourne)
Student Member	$12.00
Associate Member	$ 5.00 (No News Bulletin)

No additional fee is payable for overseas posting by surface mail of the news bulletin. Associate Members, resident at the same address as, and being immediate relatives of an ordinary Member, do not automatically receive the Society's publications but in all other respects rank as ordinary Members.

Cover design by Alan Hyman.

Cover illustration of *Synlestes weyersii tillyardi* (O.: Synlestidea) ♂ by Catherine Symington.

MINUTES OF THE GENERAL MEETING, 15 AUGUST 1997

The President, A. Kellehear, opened the General Meeting at 8:02 pm.

Present: L. Barrow, P. Carwardine, C. Dickson, D. Dobrosak, I. Endersby, E. Grey, A. Kellehear, R.. MacPherson, D. & N. Stewart.

Visitors: A. Dobrosak, P. Grey, C. & P. Riggs

Apologies: D. & N. Stewart, A. & E. Farnworth.

Minutes: Minutes of the 20 June 1997 General Meeting [*Vic. Ent.* 27(4):65-66] were accepted (I. Endersby/D. Dobrosak).

Treasurer's Report: The Treasurer presented the financial statement as of 15 August 1997:

Account balances stand at: General Account $4,906; Le Souëf Award Account $3,109. Membership is 104 including 7 Associate members and 10 subscribers.

Editor's Report:

The Editor reported that articles were in hand for the next two issues of *Victorian Entomologist*.

Correspondence:

- Letter from AES accepting the Society's sponsorship of the publication of the proceedings of the Australian Entomological Society's Annual Conference.

Speaker:

The speaker, Ian Endersby, a Society Councillor for many years and a recognised authority on Odonata presented a fascinating and educational talk on this ancient order of insects. A summary of his talk, kindly provided by the speaker, is presented below:

Dragonflies have an aesthetic place in the environment often being called the "birdwatcher's insect" because of their spectacular colour patterns and interesting displays of behaviour. They are also studied by evolutionary biologists, particularly those interested in the topic of sperm competition. Dating from the enormous specimens of the Carboniferous, they now comprise three suborders: damselflies (zygoptera), dragonflies (anisoptera) and the anisozygoptera, which have some of the characteristics of each of the other two groups, but are known predominantly from the fossil record with extant species only in Japan and Nepal.

Mating in dragonflies commences when the male clasps the female behind the head with the end of his abdomen. If she responds he transfers sperm to a set of secondary genitalia on segment 2 of his abdomen. The female then bends her body into the "wheel" position so that the end of her abdomen is in contact with the male genitalia. In some species copulation is divided into phases, the first of which has a duration sometimes of hours and the second is rapid. Experiments have shown that during phase 1 the male is removing the sperm of previous matings to give his own genes precedence. Often the male guards the female during oviposition, either still in the "tandem" position or by hovering nearby. These examples of sperm competition also have parallels in other animal groups.

Although insects cannot control their body temperature physiologically they need to keep it within limits by behavioural means. Dragonflies bask in full sunlight to raise their muscles to an appropriate temperature for flight. On very hot days some species reduce the insolation received by pointing their abdomen towards the sun in the "obelisk" position, thus presenting the smallest surface area to the radiation. Some species control pigment granules within their epidermal cells to appear dark when they are cold and bright iridescent blue when warm. By adopting a "black body" configuration when they are cold they will heat faster than their counterparts who retain bright colours, thus gaining earlier access to food and territorial spots.

Studies of the aerodynamics of dragonfly flight reveal that their rapid ability to turn for some species is achieved by banking whilst others tend to yaw. Generally, dragonflies fall into two categories: "perchers" which establish a territorial vantage point and fly short sorties to feed, defend their territory, or approach a potential mate. "Patrollers" perform similar tasks while flying up and down a stretch of waterway.

Many of the decisions which dragonflies appear to have to make have interesting analogues in the world and jargon of economic trade-offs: whether to spend time guarding egg-laying females or to attempt further matings; whether to hunt large prey that have a high capture and handling cost but large reward, or to take a lot of more smaller, easier prey; whether to exhibit bright colours and conspicuous behaviour to achieve more matings but exposes the insect to a higher level of predation. Answering these sorts of question, together with their well developed sperm competition behaviour, make the order Odonata an important source for the behavioural ecologist.

The President thanked Ian Endersby for his scholarly and accessible talk.

General Business:

Application for membership: An application for membership was received from Mr C. J. Knight.

Exeursion to the Institute for Hortieultural Development: Members were reminded that the next General Meeting will consist of an excursion to the Institute for Hortieultural Development at 621 Burwood Highway, Knoxfield, 8 pm 17 October 1997.

The meeting was closed by the President at 9.35 pm.

MINUTES OF COUNCIL MEETING, 19 SEPTEMBER 1997

Present: D. Dobrosak, I. Endersby, A. Kellehear, P. Carwardine, D. & N. Stewart.

Apologies: R. MacPherson.

Treasurer's Report: The Treasurer presented the financial statement as of 19 September 1997:

Account balances stand at: General Account $4,662; Le Souëf Award Account $3,264. Membership is 102 including 7 Associate members and 10 subscribers. The change in the Award Account since the last report is due to the resolution of a bank error.

Editor's Report:

The Editor reported that articles were in hand for the next two issues of *Victorian Entomologist*. Further articles would be most welcome.

Correspondence:

- Myrmecia
- Australian Journal of Entomology
- Vicnet, detailing changes to the FTP host address.
- Carolyn Taylor
- Department of Conservation and Natural Resources. Permit to collect and retain taxa listed under Schedule 2 of the Flora and Fauna Guarantee Act 1988.
- Nigel Quick advising on aspects of the ENTRECS scheme and requesting information regarding records *of Toxidia parvulus* in Victoria later than December 1945.

General Business:

- **List of Common names for Butterflies:** The current issue of the Australian Journal of Entomology 36: 197 -212, may be of interest to many members as it contains a paper titled "A provisional list of common names for Australian butterflies" by M. F. Braby, A. F. Atkins, K. L. Dunn, T. A. Woodger and W. N. B. Quick.
- **Open Training & Education Network:** The Open Training & Education Network requested permission to use the development of the Society's News Bulletin front cover as a design example in a desktop publishing course. A consent form was sent to the Open Training & Education Network by the Society's Secretary stipulating that the Society would be duly acknowledged and Alan Hyman would approve any entomological terms.
- **Program for the first half of 1998:** D. Dobrosak reported on the next year's speakers. February: a talk by Paul Horne on Integrated Pest Management. April: a talk by Simon Hinekley of the Museum of Victoria on Ants. June: the Presidential Address titled: "A Passion for Small Things - A History of Entomology".
- **Excursions:** An Insect survey is proposed to the Organ Pipes National Park, near Sydenham on 9th November and 13 December. It is proposed to undertake a comprehensive survey on three insect groups or orders i.e. Lepidoptera, Coleoptera and Aquatic insects. The survey is conditional upon the renewal of the Society's Research Permit from the Department of Natural Resources and Environment.
- **Production of an Introductory Entomology Video:** D. Stewart proposed that the Society could obtain external funding to produce an 'Introduction to Insects' video targeted at Primary Schools. The concept was endorsed and would be developed further at the next Council meeting.
- **Science Talent Search Quest:** The announcement of the awards for the Science Talent Search Quest will be made on 28 October at La Trobe University. The Society provides bursaries to the Science Talent Search Quest.
- **Permit to collect and Retain Listed Taxa:** The conditions of the Society's permit to collect and retain listed insect species listed under the *Flora and Fauna Guarantee Act* 1988 will be published in the October issue of *Vic Ent.* (p 102-103). Council discussed the Permit and its potentially onerous conditions and would welcome Society member comments on whether the permit is of benefit to members and if it should continue to be renewed annually.
- **ENTRECS:** D. Dobrosak reported that thanks to Nigel Quicks assistance, the Society will be able to issue new Contributor Numbers and will soon have available a stock of Record Sheets.

The meeting was closed by the President at 9.43 pm.

GARDEN OBSERVATIONS ON THE AUSTRALIAN ADMIRAL BUTTERFLY

Robert Powell
54 Bournemouth Crescent, Wembley Downs, W.A. 6019

Since 1992 I have been growing in my garden native pellitory (*Parietaria debilis*), the native food-plant in South-Western Australia of the Australian admiral butterfly (*Vanessa itea*) — i.e. the plant on which its caterpillars feed. This paper presents observations on this insect made during 1996 by me or (where noted) by M. George and recorded in my garden diary during 1996; some references are made also to earlier diary recordings, and to observations by O. Mueller in another garden. Preceding this is a description of the plant and the conditions in my garden.

NATIVE PELLITORY

Native pellitory is an annual plant up to 40 centimetres tall that occurs in southern Australia, including the Perth area, and other parts of the world (Marchant *et al.*, 1987, p. 71; George, ed., 1989, pp. 91-2). In the Perth Metropolitan Region it occurs in the Darling Range, at the base of granite boulders; near the coast, in the belts of Quindalup and Cottesloe soils (as defined by Bettenay *et al.*, 1960, p.13), and on offshore islands.

Based on observations in my garden, native pellitory in Perth begins to germinate some time in May, or in April if there are good rains. It dies mostly in November, but some plants in moist, shady spots continue into December.

Native pellitory is the only native plant in the nettle family (Urticaceae) in south-western Australia, and the only known native food-plant of the Australian admiral in this region. The admiral is believed to lay eggs only on plants in the nettle family, and is known to use the following introduced members of the nettle family as food-plants: perennial pellitory (*Parietaria judaica*), babies' tears (*Soleirolia soleirolii*), Eastern Australian nettle (*Urtica incisa*) and small nettle (*U. urens*) (Powell, 1993; Common & Waterhouse, 1981, p. 400). Perennial pellitory and the two nettle species grow as weeds in parts of the South-West; babies' tears is grown as an ornamental plant in cultivation.

MY GARDEN

My garden is 1.4 kilometres from the ocean and in the belt of Cottesloe soils (Bettenay *et al.*, 1960, p. 13). The natural soil profile is little disturbed, and comprises shallow brown loamy sand over limestone, the limestone cropping out in places. The block has an area of 1,114 m^2, of which about 700 m^2 is devoted to garden.

The garden is a remnant of the original vegetation, containing over 40 local plant species. The main area is at the back (550 m^2). It contains a tuart tree (*Eucalyptus gomphocephala*); tall shrubland of chenille honey-myrtle (*Melaleuca huegelii*), basket bush (*Spyridium globulosum*), berry saltbush (*Rhagodia baccata*) and parrotbush (*Dryandra sessilis*); and low shrubland of couch honeypot (*Dryandra nivea*), feather spear-grass (*Stipa elegantissima*), berry saltbush, coast honey-myrtle (*M. acerosa*), cockies' tongues (*Templetonia retusa*) and one-sided bottlebrush (*Calothamnus quadrifidus*).

The front garden (100 m^2) contains two tuart trees with an understorey of basket bush, berry saltbush and red-eyed wattle (*Acacia cyclops*). At the side of the house is a further area of garden (60 m^2), of red-eyed wattle, coast daisybush (*Olearia axillaris*) and berry saltbush.

No native pellitory survived as part of the original vegetation, but this species is quite likely to have occurred on the site originally.

The garden is managed to preserve this remnant of the original vegetation. It is weeded but not watered, except for a few new plants of the local species planted in the barer areas.

Four plants of native pellitory were introduced to the garden in 1992. As a result of natural reproduction, the number of specimens increased to 52 in 1993, about 250 in 1994 and about 650 in 1995. The number of specimens was not counted in 1996, but was roughly double the number in 1995.

The increase in biomass of native pellitory has not been in proportion to those numbers, since in 1995 and 1996 specimens have occurred thickly in places. In thick growths, specimens are erect and slender, containing much less biomass than more isolated specimens, which have well developed side-branches.

The area of the garden covered by native pellitory in 1996 was about 70 m^2, in 9 patches, of which the largest was 30 m^2, in the middle of the back garden. The total area of pellitory in the front garden was 10 m^2, in two main patches.

Native pellitory is also called 'shade pellitory', and prefers dappled shade. Most of the pellitory plants in the garden grow in the shade of shrubs or trees. The largest patch is under a stand of chenille honey-myrtle.

OBSERVATIONS ON THE AUSTRALIAN ADMIRAL

Each year since the pellitory has been present in the garden, admirals have arrived and laid eggs on it. With the increased amount of pellitory in 1995 and 1996, the number of admiral larvae has correspondingly increased. The sightings of fresh specimens of admirals in the garden in October and November of 1995 were the first indications that the admiral had bred successfully in the garden.

The following observations, except where otherwise indicated, were recorded in the garden in 1996. Between 8 August and 11 September of that year they were made almost daily; thereafter they were more intermittent, chiefly at weekends.

Seasonality and Abundance

In the years before native pellitory was introduced, few admirals were seen in the garden (or flying over it). Of the 9 such years when sightings were recorded (Table 1), no admirals were seen in 4 years, and in all but 2 years no more than 2 were seen.

In 1996 admirals were seen in the garden between 12 August and 1 December, and were numerous in late August and September. Far fewer were seen in October and November, but they were still sighted frequently, the number of different individuals being about 11 and 15 respectively (Table 1).

Admirals may be seen in Perth at any time of the year: over the years, I have recorded them every month except January. I have seen very few in summer, however, slightly more in March and April, more still in May to July (particularly in May), and most between August and November (particularly August and September). The garden sightings fit into this general pattern.

TABLE 1: NUMBERS OF ADMIRALS SIGHTED IN GARDEN IN 1982-90, WHEN THERE WAS NO NATIVE PELLITORY, AND IN 1996, WHEN NATIVE PELLITORY WAS WELL ESTABLISHED*

YEAR	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEP.	OCT.	NOV.	DEC.
'82					—	—	—	1	—	—	1	—
'83	—	—	—	—	—	—	—	—	—	1	1	—
'84	—	—	—	—	—	—	—	9	1	1	—	—
'85	—	—	—	—	—	—	—	—	—	—	—	—
'86	—	—	—	—	—	—	—	—	—	—	—	—
'87	—	—	—	—	—	—	—	—	—	—	—	—
'88	—	—	—	—	—	1	—	4	—	—	1	—
'89	—	—	—	—	—	—	—	1	—	—	—	—
'90	—	—	—	—	—	—	—	—	—	—	—	—
'96	—	—	—	—	—	—	—	many	many	11	15	1

* the recordings begin when I moved to this house, in May 1982.

Origin of Admirals Seen in Garden

These individuals can be divided into two categories according to their origin:
visitors (i.e. emerged as adult butterflies elsewhere);
newly emerged specimens (i.e. emerged as adults in the garden).

One can never be really certain that a butterfly has emerged in the garden unless one actually sees it in the act of emerging from its pupal case. Nevertheless, there are some differences between newly emerged admirals and visitors that allow one to be almost certain of which is which; these are set out in Table 2.

TABLE 2: DIFFERENCES BETWEEN NEWLY EMERGED AND VISITING ADMIRALS

NEWLY EMERGED	VISITOR
• perfect specimen: brightly coloured, no wing damage	• nearly always some degree of fading or wing damage
• may appear early morning	• does not usually appear before mid morning
• spends much of time resting, often with wings together but with forewings spread forward	• spends less time resting; when resting with wings together, forewings are held between hindwings
• less wary: sometimes allows close approach	• wary
• does not visit pellitory	• nearly all specimens visit pellitory plants

Visitors

Although the sexes of the admiral are virtually indistinguishable in the field, there can be little doubt that the great majority of those that visited the garden were females. Many were seen to settle on the pellitory plants, as though laying eggs.

In 1996 visiting admirals were first observed in the garden on 12 August, when two were seen, of which one was observed to lay eggs. By this time the pellitory plants, most of which had germinated in May and June, were well developed and leafy.

The period of greatest abundance of visiting admirals was from 21 August until at least 7 September: at least one specimen was observed every day between those dates, and more than one every day between 23 August and 6 September.

On 25 August, 2 September and 5 September, I recorded 4 or more specimens being present at the one time. This would be a very conservative estimate of the total number present in the garden, since only a small part of the garden can be seen from any one vantage point.

Numbers apparently decreased after 7 September. I was unable to observe the garden on 8 September or 10 September. On 9 September I recorded 'at least two admirals' in the garden, but saw none on a brief inspection of the garden at 3 p.m. on 11 September. I was then away until 27 September; but M. George, who visited the garden on 5 days during 12-27 September, saw one admiral on 4 of those days.

From the second or third week in October emergent butterflies began to appear. Some specimens were not seen closely enough to determine whether they were visitors or emergents. However, definite visitors were seen on 12 October (faded, egg-laying), 13 October (same faded specimen plus bright egg-laying specimen), 14 October (egg-laying; seen by Ms George) and 20 October (two of 3 bright specimens seen were laying eggs). No visiting admirals were seen in 1996 after 20 October.

During the same period when visiting admirals were observed in the garden (i.e. 12 August to 20 October), few were seen elsewhere in Perth. Small numbers were seen on a couple of late-afternoon visits to the top of Reabold Hill, a favourite place for hilltopping males (Powell, 1992, p. 24), but otherwise only three specimens were sighted. These were:

1/9, near Town of Cambridge Office, City Beach
6/9, Cobb Street, Doubleview
11/9, Stirling Highway, Crawley

In each of those cases the butterfly was flying south.

Condition

A good look at many of the visitors was gained. Some were quite bright, but most were faded to some degree. Nearly all specimens had some damage to their wings, particularly bits out of the edges. One specimen, described under 'Duration of Visits', below, was considerably damaged.

Time of Day when Active

In August and September, visiting admirals were most active in the middle of the day. They were typically first seen about 11 a.m. (11 a.m. on 21/8 and 25/8; 11:30 a.m. on 26/8; before 10 a.m. on 2/9) and last seen about 3:30 p.m. (after 3:30 on 26/8; 3:20 on 2/9; 3:50 on 4/9). Further into the spring the period of activity was longer. On 20 October the last was seen until after 4 p.m.

Flight Behaviour

Visiting admirals in the process of laying eggs fluttered gently from one pellitory plant to another. This is a very different from the rapid, powerful flight that is generally seen in this species.

The slow, fluttering flight was used only in the vicinity of pellitory plants and among the stems and branches of shrubs. Specimens flying from one part of the garden to another, across open areas or above the shrub canopy, switched to the rapid mode of flight.

Duration of Visits
Since many of the visiting admirals had bits out of their wings, they were readily recognizable; thus it was often possible to tell whether individuals seen on particular occasions had been seen previously.

Many, probably most, did not stay for more than a day, but some did. One specimen (of average size, slightly faded and with bits out of its hind wings), first observed on 22 August, was also seen on 23, 24 and 25 August.

Another was seen every day between 24 August and 3 September, an exceptionally long period, of 11 days. This was a most distinctive specimen, which was missing almost all of both hindwings, although its forewings were almost complete. It appeared to spend a large part of its active time each day going from place to place in the garden, laying eggs; on occasions it was also seen visiting flowers. Despite the severe damage to its wings, it flew quite well, although its ascents were somewhat laboured.

I gained the impression that the specimens that visited the garden for more than one day tended to be the more battered or faded ones, although that could have been at least partly due to the greater ease of recognizing such specimens.

In previous years I was unaware of any specimens remaining in the garden for more than part of a day.

Resting
In August and early September, between periods of egg-laying, admirals would frequently settle in a sunny spot. A favourite place was on the sunlit southern fence, where they would rest head-downwards, wings either open or closed. Specimens disturbed in this position would dart off suddenly, at great speed. If left undisturbed, they would open their wings for a short period before flying (unless already open) and often move their wings up and down a few times, through a short arc.

Chasing
Where two admirals encountered one another in the same patch of pellitory, they would often chase one another. This behaviour was also noted by Mueller (1997). Where specimens were of different size, the chasing would end with the larger chasing the smaller.

On one occasion (31/8) two specimens were seen to interact, not immediately over the pellitory plants, but three or four metres up in the air. On another occasion an admiral chased a cabbage white (*Pieris rapae*).

The interactions of female admirals in the vicinity of pellitory plants are far less spirited and vigorous than those between males on hilltops [described in Powell, 1992, and Houston *et al.*, (1994), p. 28].

Visiting Flowers
From time to time the butterflies were seen feeding at flowers in the garden, including those of *Leucopogon parviflorus*, parrotbush (*Dryandra sessilis*), basketbush (*Spyridium globulosum*) and *Hardenbergia comptoniana*. The amount of time thus spent, however, was small compared with the time spent laying eggs or just resting.

Mating
On 5 September at 4 p.m. I saw two admirals on the south fence in copulation. The tips of their abdomens were joined together, and they remained motionless, wings closed. Their bodies were at an angle of about sixty degrees to one another, one horizontal, the other pointing about thirty degrees from the vertical. They remained in the same position until at least 4:50 p.m., but had gone by 5:35 p.m. It was a sunny day, with a maximum temperature of 23.6 °C.

This mating occurred at the time when I made the greatest number of opportunistic sightings of admirals elsewhere in the suburbs of Perth (see Visitors, above).

Life-Cycle in Garden

Egglaying and Eggs
Admiral eggs were first seen soon after 12 August, and their numbers increased over the following weeks. They were laid on every patch of pellitory in the garden, but not on every isolated specimen.

Most of the eggs were laid on the pellitory plants, although females were sometimes observed to lay on other objects close by, such as twigs or a wall. Mueller (1997) noted that some eggs were laid on wooden stakes near pellitory plants in his garden. All the eggs seen were laid singly, mostly on the upper side or underside of the plant leaves, but sometimes on the edge of a leaf.

A considerable number of eggs must have been laid, judging by the amount of egg-laying activity observed. Mueller (1997) watched one specimen on one afternoon 'touch down' over one hundred times. Although most egg-laying took place when the sun was out, it can also occur when the sun is behind a cloud. On 30 August (maximum temperature 21.6 °C), I observed two specimens laying when the sun was under a cloud and had been so for 30 minutes.

Many eggs disappeared, presumably because of predation (see 'Predation', below).

From my observations of when the first eggs were laid (12/8) and when the first signs of larvae appeared (29/8), it seems that the eggs take a fortnight or more to hatch in winter.

Larvae
After the first signs of larvae, on 29 August, they continued to be observed until 20 November. By 27 September, there were many larvae present of all different sizes.

The very first signs of larvae are bits eaten out of the small, growing leaves at the top, or end, of the stem. Following that, the main sign of young larvae is the shelters they make in the upper leaves of the plants, by bending down the sides of a leaf, or part of a leaf — or, in the crown of the plant, by joining two or more leaves together. In the days following 29 August, these signs became more and more obvious and numerous.

The larger, nearly fully grown, larvae were most numerous in the first half of October. At this stage of development they are less inclined to make shelters, but apparently hide elsewhere during the day, since they were seen in greatest numbers at night, with the aid of a torch, feeding openly on the pellitory plants.

On more than one occasion large larvae were noted on isolated pellitory plants that in previous days had been devoid of large larvae. They therefore move about, presumably in search of new plants to eat. O. Mueller (pers. comm., 9/10/96) observed some of his larvae crossing the road, but it is unclear whether these were looking for new plants to eat or for spots in which to pupate.

Effect of Larvae on Plants
Many of the pellitory plants in the garden had some but not all of their leaves eaten (the lower leaves tended to be the ones left). A smaller number had all of their leaves eaten but not their fruiting calyces, and a few plants had all of their leaves and many of their fruiting calyces eaten. Admiral larvae seem to prefer the leaves, and only eat the fruiting calyces if there are no leaves left to eat. Plants with their fruiting calyces eaten off were observed only in some of the small patches of pellitory, where food for the larvae was limited.

Pellitory plants stripped of their leaves will usually still seed well. If the plant is near the end of its life, it may not grow new leaves, but by that stage it will have already produced seed. If stripped at a younger stage, most plants will sprout new leaves, and continue to grow and produce seed.

Plants stripped of their fruiting calyces, as well as their leaves, will usually sprout new leaves. But to reform new fruiting calyces takes longer, and will only occur if the plant has enough time left before the growing-season expires.

Pupae

Only 2 pupae were found in 1996, the first by M. George during my absence during 12-26 September, and the second by me on 18 October. Both pupae were attached to pellitory plants and quite visible, and both disappeared prior to the end of pupation.

In 1995, 3 pupae were found, all attached beneath overhangs on a limestone rock. The first of these was first seen on 11/10/95, 45 days (1½ calendar months) after the first admiral for the season was seen, on 27/8/95. Two of these 3 disappeared prior to the end of pupation. The remaining pupa presumably emerged as a butterfly, since a complete empty pupal case was later found (1/11/95). This specimen pupated on 14/10/95 and remained a pupa until 31/10/95, a duration of 18 days.

Although few pupae were found in 1996, it was obvious from the number of newly emerged butterflies seen (see 'Emergent Butterflies', below) that many larvae pupated.

Likewise, Mueller (1997) found very few pupae compared with the number there must have been. He reports finding (on 10 December, after 'a long absence' from his garden) 8 empty pupal cases attached to his pellitory plants, whereas earlier (7/10) he had counted over 200 larvae, at a stage when many must have been nearing pupation (he found the first two pupae on that date).

About the time Mueller's larvae were pupating, he found larvae 'all over the garden' (Mueller, 1997); he also saw some crossing the road (O. Mueller, pers. comm., 9/10/96).

Predation

There was evidence of predation of all the admiral's immature stages: eggs, larvae and pupae. Possible predators include spiders, ants, lizards and birds. Various types of spider were seen on the pellitory plants in late August and in September, jumping-spiders being particularly abundant. A good number of ant species inhabit the garden: nineteen were recorded some years previously, as part of a survey of ant species in Perth gardens (Majer & Brown, 1986).

Nine species of lizard have been identified in the garden, including the bobtail (*Tiliqua rugosa*). On 12 October I observed a bobtail with what appeared to be an admiral larva in its mouth. A few days earlier (6/10) I had noticed that some of the pellitory plants in the largest patch had been flattened; and on subsequent days more flattened plants were observed. The cause was very likely bobtails, and this suggests that one or more of these lizards may have spent some time hunting admiral larvae. Abundant in the garden is *Morethia obscura*, a very active species of small skink, which I have observed (29/8) to catch grasshoppers and moth caterpillars.

Birds common in the garden include the red wattlebird (*Anthochaera carunculata*) and the singing honeyeater (*Lichenostomus virescens*), and parties of magpies (*Gymnorhina tibicen*) visit the garden from time to time.

An example of predation of the admiral larvae is given above. Disappearance of eggs was observed, and noted on 29 August, and the disappearance of pupae was recorded four times during 1995-96 (see 'Pupae', above). A bit of the pupal case of one remained (near the cremaster), but no trace was found of the other three.

Given the large numbers of eggs that must have been laid in the garden, there can be little doubt that predation was high. Otherwise the numbers of larvae would have been such as to strip the plants bare, as occurred in the garden of O. Mueller: he reported (1997) that, by 7 October 1996, his 'deep green and lush pellitory pasture is by now threadbare'.

Emergent Butterflies

The first specimen that was almost certainly newly emerged (based both on appearance and behaviour, as set out in Table 2) was seen on 13 October, and the last on 1 December. Other dates on which newly emerged admirals were recorded were: 16, 18, 19 & 20 October, and 2, 3, 9, 23 & 30 November.

Of particular interest were the sightings made on the weekend of 2-3 November. On 2 November between 8:30 and 10:30 a.m. I made 8 or 9 sightings, in different parts of the garden, of what appeared to be freshly emerged admirals; a further fresh specimen was sighted about 1:15 p.m. Although never more than one was seen at any one time, it is likely that several different specimens had emerged in the garden that day; some seemed to be larger than others. On the following day, 3 November, I made two sightings of freshly emerged admirals.

Three of the butterflies sighted on 2 November were flushed from much the same spot: the sunny side of a dense shrubby area of coast daisybush with berry saltbush growing over it.

Most sightings of newly emerged admirals were made in the morning. Twice they were seen at 8:30 a.m. (the earliest time recorded), each time being shortly after I had gone into the garden. A few sightings were made in the early afternoon and a few in the late afternoon (at 4:15 & 4:30 on 9/11, and at 4:30 on 30/11).

It appeared that most of the freshly emerged admirals left the garden during the day they emerged. Some were seen to leave. Moreover, after so many sightings of freshly emerged specimens on 2 November, only 2 were seen on 3 November; one of these behaved as though it had only just emerged. On the other hand, the fact that a few sightings of recently emerged specimens were seen in the late afternoon suggests that some may remain all day, perhaps leaving early the next day.

The size of the newly emerged admirals was in general about average. Of the four specimens seen between 13 October and 19 October, three seemed to be slightly larger than average, whereas the several specimens seen on 2 November were average to slightly less than average.

DISCUSSION

The native pellitory in the garden attracted a great number of admirals, in fact a surprisingly high number, given how few were observed elsewhere.

Fisher (1978) states that:

> 'The initial attraction to a particular plant or oviposition site may be the result of both visual and chemical stimuli. The visual stimulus may be induced by colours and shapes associated with the plant and the chemical stimulus by airborne molecules of volatile chemicals contained in the plant tissues ...' (p. 16).

In the case discussed here, it can be assumed that the initial attraction was a chemical one, since native pellitory is a small plant and not very conspicuous from any distance. Moreover, the low number of admirals observed in Perth in general suggests that admirals may have been attracted to the garden from a considerable distance.

Nearly all these visiting admirals appeared to be females. The occurrence of copulation in the garden, however, shows that the odd male came by as well. The mating occurred at the time

when admirals appeared to be at their greatest abundance in Perth; the male may not have been attracted to the garden but may have just happened to be passing by. Admirals probably pair most often on hilltops, rather than in the vicinity of food-plants (Powell, 1992).

It is widely thought that female butterflies seldom mate more than once (e.g. McCubbin, 1971, p. xxv), although Matthews & Kitching (1984, p. 65) note that a female wanderer (*Danaus plexippus*), a long-lived species, may mate three or four times during its life.

The female of the copulating pair of admirals could not have emerged in the garden, since at that stage of the year no development from eggs laid in the garden had progressed past the stage of young larvae. It must have emerged elsewhere and was presumably in the garden for the purpose of laying eggs. It is therefore likely to have mated previously: perhaps female admirals, like female wanderers, will mate more than once.

The main period of egglaying (in Perth) is late winter to early spring, and the resultant new generation of butterflies emerges some 8-10 weeks later, from mid October through to early November. Two of the 8-10 weeks are spent as eggs, 4-5 as larvae and 2-3 as pupae.

The recordings on 13 October and 20 October of egglaying specimens that were bright and unfaded, suggests that, in the Perth area, this new generation in turn lays eggs. This was at the end of the egglaying sequence; nonetheless, it appears that this laying has some success in producing a further generation, as evidenced by the last of the newly emerged butterflies, recorded on 30 November and 1 December. This implies a shorter period, 6-7 weeks, for the development from eggs to adults, as might be expected from the higher temperatures in late spring. [The influence of temperature on how fast the immature stages develop has been documented by biologists such as Matthews & Kitching (1984, p. 64).]

Given that native pellitory usually begins to germinate in mid to late autumn, there is also the possibility of a generation preceding the main egg-laying period, of late winter to early spring. For this to happen, the eggs would probably need to be laid no later than the end of June (allowing a period of 10 weeks, at this time of year, between egglaying and the emergence of the next generation). From the observations of R.W. Hay (pers. comm.), it appears that a generation at this time would be completed only occasionally. Hay, who has attracted egg-laying admirals to his garden each year since he began growing nettles (*Urtica urens*) twenty years ago, has observed them laying in June only once.

Admirals will also occasionally lay in June on native pellitory: this year (1997) I observed the first admiral in my garden, and the first admiral eggs, on 22 June. However, the number of admiral larvae that would be able to develop on this plant from eggs laid at this time of year would be quite limited, since native pellitory tends to remain quite small until late winter (unlike nettles, which grow larger and faster).

Hence a complete generation before the main egg-laying period would occur in Perth only to a limited degree, particularly where the food-plant is native pellitory. However, since R.W. Hay (pers. comm.) has quite commonly observed admirals laying in his garden in July, some larvae obviously hatch well before the main egg-laying period.

The slow fluttering flight of the admiral when laying eggs is apparently similar to the egglaying behaviour of one of its close relatives in the northern hemisphere, the red admiral (*Vanessa atalanta*). Thomas & Lewington (1991, p. 130) state that 'an egg-laying Red Admiral is quite easy to spot due to its rambling, fluttery flight, during which it fussily investigates every nook and cranny, giving the general impression of a broody hen'. In suggesting a reason for this behaviour, the authors go on to quote Moses Harris, writing in 1766: 'I have often perceived her, when about to lay an Egg, creep in among the Nettles; which I imagine is not only to place the Egg from the heat of the Sun, but likewise to see if those Nettles are frequented by Ants, these Creatures being very destructive to caterpillars'.

The same reason — that of taking care where to place eggs — might also apply to the Australian admiral's similar behaviour. However, I wish to suggest an alternative one: that the behaviour in the Australian species might have evolved in order to reduce the damage to the butterflies' wings during egg-laying. Native pellitory typically occurs in shady places, often in amongst the stems, branches and often prickly foliage of shrubs. The slower the butterflies fly, and the more gently their wings beat, the fewer and less damaging their collisions with the many obstacles they encounter in visiting plants to lay eggs. This theory also explains why, even when two egg-laying specimens interact, they do so in a rather gentle manner, quite unlike the vigorous interactions between males.

My theory is supported indirectly by the behaviour of another relative of the admiral, the Australian painted lady (*V. kershawi*), whose food-plants, various daisies, grow in more open areas, where there tend to be far fewer obstacles. The painted lady does not adopt the admiral's behaviour when laying eggs, but flies swiftly from plant to plant (Houston, 1994, pp. 31-2).

That most admirals did not stay in the garden more than a day, despite the healthy stands of native pellitory scattered over the area of the garden, demonstrates that this is a mobile species, specimens having a strong tendency to move on to new areas. By not 'putting all their eggs in the one basket', as the saying goes, these butterflies are probably enhancing their likely success in reproducing.

It seemed to be mostly the more battered and faded individuals that stayed in the garden more than a day. These would have less chance than fresher specimens of finding good new areas of food-plants on which to lay more eggs, having less long to live, and being less lively and alert — so they would have more advantage than fresher specimens in staying in the garden longer.

In years previous to 1996 the amount of pellitory in the garden was much less, and the plant was also less widely distributed over the area. That could explain why I had not previously noticed any admirals staying in the garden more than part of a day.

Another behaviour that would relate to an individual butterfly's success in reproducing is chasing, observed both by me and by Mueller (1997). By chasing other butterflies away from good areas of pellitory, individuals can, at least to a limited degree, reserve these good egg-laying sites for themselves.

Predation of admiral eggs and larvae is important in ensuring that the larvae that survive have enough food, and also that the pellitory plants do not get too badly eaten. (However, plants severely eaten by admiral larvae can apparently still produce a moderate amount of seed: an inspection of O. Mueller's garden in May 1997 revealed a good germination of pellitory.)

If butterfly larvae do not get enough to eat, either they die or they do not grow to full size. The fact that the newly emerged butterflies in my garden were, generally speaking, of average size, shows that most larvae were adequately fed. Those of below average size were only slightly below average, and were among those that emerged when the greatest numbers of butterflies were emerging. The time when they were larvae would probably have been when there were most larvae present, and therefore probably most competition for food.

The eight pupal cases referred to by Mueller (1997), which he displayed at a meeting of the Western Australian Insect Study Society, were all noticeably well below average size. They may have been a biased sample, given that they were all attached to pellitory plants (the more robust larvae probably having gone off to pupate elsewhere). However, they nonetheless suggest that, where too many larvae develop, many are underfed. Mueller's pellitory plants, 'threadbare' by 7 October 1996 (Mueller, 1997), further support the idea that food was inadequate for the number of larvae present.

That neither O. Mueller nor I found many pupae suggests that the larvae are able to select good hiding-places in which to pupate. In some instances they may travel quite some distance to do so.

Of interest is that three newly emerged butterflies in my garden were flushed from on or near the same dense mass of shrubs (a mature specimen of coast daisybush with berry saltbush beside and climbing over it): it is spots such as this where pupae are probably least likely to be detected by birds.

Many different aspects of the admiral's biology have been covered above. However, one important one remains, and this is particularly interesting and difficult to answer: what happens during summer and early autumn, when admirals are so rarely seen in Perth?

These are perhaps the main possibilities:

1. the butterflies continue to breed and produce new generations during summer and autumn;
2. the butterflies do not breed until the next winter/spring, but survive from the previous spring/summer up until then;
3. admirals are highly mobile, arriving in south-western Australia in winter/spring from some other region of Australia;
4. some pupae go into a dormant state, the butterflies not emerging until the following autumn, winter or spring.

The first possibility, continued breeding, can potentially occur in Perth nowadays, on exotic members of the nettle family now established in Perth: babies' tears and perennial pellitory. However, the admiral occurred in Perth before those plants were introduced, when presumably the only food-plant was native pellitory, an annual that dies in November or December; breeding after early summer would not then have been possible.

The second implies a life-span for the adult butterfly of five or six months at the very least. The age to which the admiral lives is not well known, but Gibbs (1980, p. 122) gives some idea by stating that a relative of the admiral, the Australian painted lady (*Vanessa kershawi*), 'probably' survives 'three to four months'. That, however, would apply to an individual that remains active. Butterfly species that hibernate can live longer. Both Gibbs (1980, p. 120) and McCubbin (1971, p. 45) refer to hibernation as a habit of the admiral, at least in cold climates. Perhaps it is also able to extend its life in summer by aestivating — but this has not been observed.

The third possibility should not be ruled out. Common & Waterhouse (1981, p. 399) refer to evidence of migratory behaviour in the admiral. A further, strong indication that the admiral is highly mobile is provided by the same authors, in referring (p. 399) to its very constant appearance throughout its wide geographical range, which includes widely scattered islands in the Pacific.

Garden observations throw little light on those first three possibilities, but they do on the fourth. Since all the recently emerged admirals have been seen between mid spring and the first day of summer, and none in the following autumn, winter or spring, it appears that this fourth possibility is unlikely.

To help solve the problem of what Perth admirals do in summer and autumn, I suggest marking specimens that emerge in October/November, as well as searching in summer for any aestivating specimens. These two activities could most successfully be carried out where admirals emerge in abundance, such as on Rottnest and Garden Islands.

In conclusion, it can be seen that growing native pellitory in the garden (particularly if the plants are vigorous and grown in quantity) can be a very effective way of attracting the Australian

admiral, enabling valuable observations to be made. Garden observations in Perth may not solve the problem of what the admiral does in summer and autumn, but they can tell us a great deal else about this insect's life-cycle and behaviour.

ACKNOWLEDGEMENT

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INSECT BEHAVIOUR (2)

[An occasional series reporting examples of insect ecology or ethology from the current literature]

Estimates of lifetime reproductive success are important to the evolutionary biologist because they are used as a measure of fitness, in the Darwinian sense.

Studies in which the damselfly *Coenagrion puella* were individually marked and observed showed that smaller males achieved a higher daily mating rate than larger ones. This could lead to the conclusion that selection processes would favour a tendency towards smaller males. However the larger males lived longer thus compensating for their lowly daily rate and so short term observations would lead to the wrong conclusion about evolutionary pressures on this species.

D.J. Thompson [Lifetime reproductive success, weather and fitness in dragonflies. *Odonatologica* 26: 89-94 (1997)] extended the argument further along the following lines: Laboratory studies on the feeding rates of larvae have shown that well-fed larvae in any instar compete more successfully with poorer fed individuals and thus grow larger and develop more quickly. This leads to a population that consists of "good" and "poor" larvae. The trend continues not only through each instar, but also into the final emergence and later behaviour where the larger insects emerge sooner than the small ones and reach the breeding sites earlier.

The next stage in the story recognises that weather can influence lifetime mating success in two ways. Higher temperatures can result in a higher production of eggs by the female, and the number of sunny days has an effect because reproductive effort only takes place when the sun is shining. Thompson uncovered a paradox when he measured the average temperature for June and July in northern England. (These studies were of northern hemisphere populations.) July temperatures were higher so that it appeared that the larger specimens which emerged earlier in the season were, in fact, experiencing less optimal conditions than the smaller specimens which emerged later. Evolutionary pressures would seem to be favouring the "poor" larvae by having them emerge when the weather was more suitable for reproductive activities.

Additional laboratory experiments with large and small larvae confirmed that small larvae grew more slowly in the presence of large larvae, particularly when there were few perches from which to hunt. So there are a number of factors working against the smaller larvae: they are subject to cannibalism; their development is prolonged because they are forced away from fishing sites; and the longer they are in the water, the greater chance there is that they will suffer predation, or they will miss the window of opportunity for emergence and be delayed until the next season. In addition, late emerging dragonflies may find that suitable substrates for egg laying have been saturated by earlier arrivals.

The resolution of the paradox lies in the realisation that success as a rapidly developing larva is of more consequence than lifetime mating success as an adult. Behavioural ecologists need to examine the full life history to unravel puzzles such as this one.

LIFE HISTORY NOTES ON THE GENUS *CATOPYROPS* TOXOPEUS (LEPIDOPTERA: LYCAENIDAE) FROM NORTHERN AUSTRALIA.

Peter S. Valentine and Stephen J Johnson

Two species of the genus *Catopyrops* Toxopeus occur in Australia; one extending from southern NSW along the eastern coast to Cape York Peninsula and west to the Kimberlies in WA and the other known in Australia only from the Torres Strait. This note records observations on the life history of both species in northern Australia.

Catopyrops florinda (Butler),
Common and Waterhouse (1981) recognise two subspecies, *C.f. halys* (Waterhouse) from Townsville in northern Queensland to the Illawarra district, NSW and *C.f. estrella* (Waterhouse and Lyell) from north of Townsville to the Kimberlies in WA. In the southern part of the species range the larvae have been recorded feeding on *Trema cannabina* (Ulmaceae) and also on *Caesalpinia bondoc* (Caesalpiniaceae). Recently (February, March 1997) we have reared this species in Townsville feeding on the flowers of *Pipturus argenteus* (G. Forst.) Wedd. (Urticaceae). The early instar larvae (4 mm x 1 mm) are pale yellowish, densely covered with hairs, some up to 0.5 mm long, laterally the larvae have numerous appressed stellate setae. The final instar larvae are green, covered with setae. On the third thoracic segment there are dorso and dorso-lateral patches of black setae, the remaining segments having mixed brown setae and white setae with occasional black setae in dorsal areas.

The larvae are attended by small numbers of ants (*Crematogaster* sp?) each of which actively stimulates the median dorsal organ. The ants appear to pass a single feeler tip back and forwards over the organ and it is noticeable that cilia surrounding the organ vibrate in response. Subsequently the organ secretes a small droplet of fluid which the ant immediately imbibes. As many as 5 or 6 droplets in a 2 minute period are provided. Attempts to induce pupal stridulation failed. The pupae occur in folded dead leaves on the larval food plant, in debris or in cracks in the bark, where they are brown. Occasionally pupae occur on the underside of green leaves and these are coloured green. Adults which were reared from these pupae seem closer to the northern subspecies.

Catopyrops ancyra (Felder, 1860)
This species is known from several islands in Torres Strait and is recognised as *C.a. mysia* (Waterhouse & Lyell) with other subspecies occurring in southeast Asia and Melanesia. In April 1993 we reared this species on Darnley Island (Erub Island) in the eastern Torres Strait where it was commonly seen. Larvae were found feeding on the flowers of *Pipturus argenteus* (G. Forst.) Wedd. (Urticaceae). These larvae were attended by 2 or 3 small black ants (*Crematogaster* sp?). The final instar larvae were green with relatively indistinct forward pointing chevron markings (no detailed description was made at the time).
Larvae were also found on Murray Island (Mer Island) where they were feeding upon the flowers of *Caesalpinia bonduc* (L.) Roxb. (Caesalpinaceae). This is a common coastal plant and larvae were found on shrubs growing a few metres above high tide. Parsons (1991) records the use of *Pipturus argenteus* as a larval food plant by this species in Papua New Guinea. It is interesting that both species of *Catopyrops* in Australia have now been recorded using *Pipturus argenteus* and *Caesalpinia bondoc* as larval food plants.

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WILDLIFE ACT 1975 RESEARCH PERMIT
Permit No: RP-97-079 File No: 91/3644

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Pursuant to the provisions of Section 4 of the *wildlife Act* 1975, permission is hereby granted to:

Mr D. Dobrosak
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The Entomological Society of Victoria Inc.
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Permission is given subject to the following particular conditions:

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2. Only adult male specimens of species in the Order Lepidoptera listed under the *Flora and Fauna Guarantee Act* 1988 may be collected.
3. Within 30 days of the expiration of this permit, a return is to be provided by the Secretary of the Entomological Society of Victoria to the Museum of Victoria and the Scientific Permits Officer giving details of specimens trapped and/or collected, including: species; stage of development; numbers; dates; and localities, to the nearest one hundred metres (AMG reference and Map Sheet Number and Name). The data will be incorporated into the Atlas of Victorian Wildlife.
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6. Specimens may not be given, sold, traded, displayed, offered for hire or disposed of, except as provided for in this permit. Note: the definition of trading is to sell, swap, give or barter.
7. Any registered member of the Victorian Entomological Society Inc. who collects or sights an invertebrate listed under the *Flora and Fauna Guarantee Act* 1988 must submit a return to the Secretary of the Society listing specimens collected and specimens sighted but not collected, including details of: species; date; locality, to the nearest one hundred metres (AMG) or Melways map reference number; name of collector; and address at which the specimen(s) are being held. Where attempts have been made to collect such species from known habitat(s) and no specimens were caught or sighted a nil return must be submitted detailing: dates, locations, weather conditions and indicating search effort.
8. A bound book is to be maintained as a register by the Secretary of the Entomological Society of Victoria Inc. detailing specimens collected and specimens sighted but not

collected, including: species; date; locality, to the nearest one hundred metres (AMG); name of collector; and address at which the specimen(s) are being held. A numbered label is to be attached to each specimen or specimen container, corresponding to a numbered entry in the register.

9. Wildlife habitat must not be damaged, disturbed or destroyed.

10. **The appropriate Flora, Fauna and Fisheries Co-ordinator, of the relevant Region of the Department of Natural Resources and Environment is to be notified at least five working days prior to any visit to a collecting or trapping site (see enclosed guide to Regional boundaries). The Flora, Fauna and Fisheries Co-ordinator is to be advised as accurately as possible of the location and times of proposed work and, where possible, should be given the registration number of any vehicle involved.**

In addition the following general conditions apply:

11. The direction of any authorised officer of the Department of Natural Resources and Environment. in relation to this permit, must be followed.

12. The provisions of the *wildlife Act* 1975, the *Wildlife Regulations* 1992 and the *Flora and Fauna Guarantee Act* 1988 are to be observed, except where exemption is specifically provided for in this permit.

13. At any time, the Manager Flora and Fauna Statewide Programs or an officer operating under his instructions may remove any specimen from a collection made under this permit.

14. The Manager Flora and Fauna Statewide Programs may call for the register to be inspected or for extracts from it to be made available for examination.

15. All specimens, whether entire animals or prepared tissues, remain the property of the Government of Victoria and must be registered with the Museum of Victoria within 30 days of collection.

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17. The publication of any results in connection with these specimens must refer to the fact that they were collected or obtained under the terms of this permit.

18. A copy of any research paper, report, thesis or published article resulting from work conducted under this permit is to be lodged with the Scientific Permits Officer within four calendar months of publication. In the case of theses, a thesis summary or a copy of the abstract and notification of the location of the complete work is sufficient.

19. Failure to comply with any condition of this permit will render the permit invalid.

This permit shall, unless revoked, remain in force until 30 August 1998.

(signed)...ROBERT BEGG.
Manager Flora and Fauna Statewide Programs
(Delegate of the Minister)

Date of Issue: 26 August 1997

EXCURSION AND GENERAL MEETING TO VIEW THE "VICTORIAN AGRICULTURAL INSECT COLLECTION" AND FACILITIES FOR THE REARING OF BIOCONTROL AGENTS.

8 pm Friday 17 October. 1997

Excursion to view the "Victorian Agricultural Insect Collection" and facilities for the Rearing of Biocontrol Agents. At the Institute for Horticultural Development 621 Burwood Highway, Knoxfield. Melways Map 73 C1. The entrance is just west of Scorsby Road. Park and meet at the visitors car park. A member will meet visitors at the car park and escort them to the staff room for a short meeting and overview of facility.

EXCURSION/FIELD SURVEY TO ORGAN PIPES NATIONAL PARK, KEILOR

10 am Sunday 9th November 1997

Organ Pipes National Park is approximately 20 km north-east of Melbourne, on the north side of the Calder Highway just before Calder Park Thunderdome. Meet at 10AM at the Department of Natural Resources and Environment (DNRE) Visitor's Centre/Office, Organ Pipes National Park Off the Calder Highway on the North side of the Calder Highway just before Calder Park Thunderdome (DNRE telephone number is 03 9390 1082). The Melway reference is Map 3 D4.

Bring lunch and drinks with you. New and old members are encouraged to take part in this survey. A concerted effort will be made to collect and identify three insect groups or orders i.e. Lepidoptera, Coleoptera and Aquatic insects. Voucher specimens are to be lodged with the Museum of Victoria in accordance with the conditions listed in the Society's Research Permit (pending renewal) and any members collecting specimens must do so under the supervision of the member(s) of Council, listed on the Research Permit.

Please telephone D Dobrosak on 9749 1476 prior to the 9th November to confirm that the Society's Research Permit has been renewed.

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CONTRIBUTIONS TO THE *VICTORIAN ENTOMOLOGIST*

The Society welcomes contributions of articles, papers or notes pertaining to any aspect of entomology for publication in this Bulletin. Contributions are not restricted to members but are invited from all who have an interest. Material submitted should be responsible and original. The Editor reserves the right to have articles refereed. Statements and opinions expressed are the responsibility of the respective authors and do not necessarily reflect the policies of the Society.

Contributions may be typed on A4 paper or *preferably* sent to the Hon. editor on an IBM formatted disk in *Microsoft Word for Windows, WordPerfect* or any recognised word processor software with an enclosed hard copy. Contributions may also be E-mailed to Internet address: dobrosak@.secv.telememo.au or dobrosak@werple.net.au When E-mailing, indicate italicised or underlined text by including a suitable ASCII character (e.g.*) before and after the relevant text. Formatted documents e.g. Word for Windows may be E-mailed as "uuencoded" text.

The deadline for each issue is the third Friday of each odd month.

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The charge for advertising is $5.00 per half page

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DIARY OF COMING EVENTS

8 pm Friday 17 October General Meeting & Excursion to view the "Victorian Agricultural Insect Collection" and facilities for the Rearing of Biocontrol Agents. At the Institute for Horticultural Development 621 Burwood Highway, Knoxfield.
Refer to Page 104 for details

Survey of Organ Pipes National Park 9th November 1997
Refer to Page 104 for details

Friday 21 November Council Meeting

Friday 12 December General Meeting - Members Night
Members will give short talks and slide presentations

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